

NORTH ATLANTIC STORMS DURING AUGUST, 1887.

[Pressure in inches and millimetres; wind-force by Beaufort scale.]

The paths of the depressions that have appeared over the north Atlantic Ocean during the month are determined, approximately, from international simultaneous observations furnished by captains of ocean steamships and sailing vessels; abstracts of ships' logs and other data collected by the Signal Service agencies at the ports of New York, Boston, and Philadelphia; reports received through the co-operation of the "New York Herald Weather Service;" and from other miscellaneous data received at this office up to September 21, 1887.

Of the nine depressions traced, three originated in the tropics; five advanced eastward over Newfoundland; and one left the American coast in about N. 38°. Three storms traversed the ocean from coast to coast, of which two passed eastward from the Gulf of Saint Lawrence, and one moved from the West Indies along the course of the Gulf Stream to the sixtieth meridian, and thence advanced northeast to the northward of the fifty-fifth parallel.

The depressions presented the usual characteristics of August north Atlantic storms, and, as a rule, exhibited a marked loss of energy after passing to the eastward of the thirtieth meridian. The tropical cyclones which advanced toward the Florida coast north of the West Indies, and subsequently moved northeast parallel with the American coast, were of the energetic and destructive type of storms peculiar to that region during August, and while they probably equaled in strength the tropical storms traced for corresponding months of previous years their destructive features were less apparent, owing to the course of their paths being too far to the northward to occasion disastrous winds or rains over the larger and more important West India Islands. These cyclones, more particularly the one traced as number 8, exhibited a great loss of energy during the periods occupied by their northward curve off the Florida coast, and, although their strength was augmented during their subsequent passage along the Gulf Stream, their influence along the Atlantic coast of the United States was not so severely felt on land as during the prevalence of storms of this class in previous years. The storm which is given a probable track westward over the Caribbean Sea was of slight energy.

The depressions traced over mid-ocean were rather evenly distributed throughout the month, and were, as a rule, accompanied by disturbances of pronounced strength. Over the ocean east of the twentieth meridian the weather was generally fine, while during the first half of the month settled weather prevailed off the American coast south of the forty-fifth parallel. The barometer continued relatively high in the vicinity of the Azores during the entire month, the fluctuations observed being incidental to the passage of cyclonic areas to the northward of the forty-fifth parallel.

The following are brief descriptions of the depressions traced:

1.—This depression was central on the 1st over the Gulf of Saint Lawrence, whence it moved east to N. 49°, W. 47° by the 2d, with central pressure about 29.80 (756.9); by the 3d the storm-centre had moved south of east to N. 48°, W. 38°, and thence advanced east and east-northeast to the west coast of Ireland by the 6th, without evidence of marked energy.

2.—The presence of this depression to the southward of San Domingo was indicated by vessel reports of the 5th, whence it apparently moved eastward over the Caribbean Sea into the Gulf of Mexico by the 8th, accompanied by rain and fresh gales. Its course subsequent to the 7th cannot be determined, owing to an absence of reports. Capt. A. P. Goodman, of the bark "Florence," reports, relative to this depression, as follows: "5th, 4.30 a. m., Greenwich time, in East Harbor, Caicos Islands, threatening weather, barometer 29.61 (752.1) and falling; 7.30 a. m., wind and sea rising rapidly; 8.30 a. m., barometer 29.57 (751.1), wind a hard gale, with heavy squalls and rain and high sea from se.; 10 a. m., a very heavy se. squall of wind and rain, barometer 29.55 (750.6), gale at its height; 11.30 a. m., barometer rising and wind moderating."

3.—This depression was central off the north coast of Newfoundland on the 8th, with hard gales and rain to the fortieth parallel; by the 9th the storm-centre had moved southeast to the eastern edge of the Banks of Newfoundland, whence it circled to the northeastward of the Banks during the two following dates, accompanied by moderate to fresh gales and rain; during the 12th, 13th, and 14th the depression moved eastward with a small display of energy, and apparently dissipated over the ocean to the southward of the British Isles.

The following are reports of disturbances encountered during the passage of this depression: Mr. H. H. Herbert, observer on the s. s. "Worcester," Captain Stamper, commanding, reports a strong gale on the 8th; wind veered from s. to n.; lowest barometer, 29.45 (748.0), at 4 p. m., in N. 46° 58', W. 52° 00'. Capt. J. James, of the s. s. "Pawnee," reports a fresh gale on the 8th; wind veered from sw. to n.; lowest barometer, 29.80 (756.9), at 6 p. m., in N. 37° 54', W. 56° 36'. Capt. W. Boggs, of the s. s. "Indiana," reports a heavy gale on the 7th; wind veered from se. to sw.; lowest barometer, 29.51 (749.5), at 3 p. m., in N. 41° 18', W. 55° 15'.

4.—This depression passed eastward over the northern portion of Newfoundland during the 14th and was central on the 15th in about N. 52°, W. 46°, whence it passed east and apparently dispersed over mid-ocean after the 16th. On the 13th a depression of pronounced energy, not charted, developed south of Newfoundland, and passing northward united with depression number 4 which was central over the Gulf of Saint Lawrence on the 14th. The following special reports refer to this depression: Capt. A. de Mugica, of the s. s. "Hugo," reports a strong gale on the 12th and 13th; wind veered from e. to sw.; lowest barometer, 29.53 (750.0), at 11 a. m., in N. 42° 50', W. 53° 30'. Capt. H. W. Snellman, of the bark "Toivo," reports a strong gale on the 13th; wind veered from se. to wnw.; lowest barometer, 29.42 (747.3), at 4 a. m., in N. 42° 56', W. 54° 39'.

5.—This depression apparently originated to the eastward of the Windward Islands and moved northwestward to about N. 22°, W. 63° by the 16th; moving slightly north of west, the depression was central on the 19th off the east coast of southern Florida, whence it circled northward and followed the course of the Gulf Stream until the 23d, on which date it was central in N. 50°, W. 31°. During the next five days the storm-centre pursued a diversified course over mid-ocean in the vicinity of the fifty-fifth parallel, and on the 29th had apparently moved westward and united with depression number 8 which had advanced from the westward. During the passage of this storm along the coast of the United States it was attended by hurricanes of exceptional violence; on the 22d, when central southeast of Newfoundland, a marked rise in central pressure and a considerable loss of energy were shown; with its advance over mid-ocean, however, the depression acquired great energy and was accompanied by barometric pressure ranging below 29.00 (736.6) and gales of hurricane force throughout the remainder of its course.

The following special reports have been rendered relative to disturbances encountered during the passage of this depression: Capt. J. Wilder, of the s. s. "City of San Antonio," reports a hurricane on the 19th and 20th; wind veered from ese. to sw.; lowest barometer, 28.56 (725.4), at 1.45 a. m. of the 20th, in N. 33° 48', W. 76° 36'. Capt. Frank Stevens, of the s. s. "Manhattan," reports: "20th, 9 a. m., off se. point of Hatteras Shoal, weather very threatening; barometer falling fast from 29.94 (760.5); wind from e.; turned ship around and ran to the northward as long as I possibly could for the heavy quartering sea. 11 a. m., hove-to on starboard tack, head to the eastward. 1 p. m. to 3.30 p. m., storm very severe, the wind at times estimated ninety to one hundred miles per hour, for it would flatten the sea down, and make it all foam; the air was thick with spray; during lulls a tremendous sea would arise; barometer at 1 p. m., 29.13 (739.9), wind se. 3.30 p. m.,

barometer commenced to rise, and wind veered to s. and sw., and commenced to moderate, when it hauled to nw. and cleared off. I had no warning of this storm until it was on me, for when I turned to run from it the barometer had been stationary at 29.94 (760.5) all night, the first part of the night being clear and starlit."

Capt. Robert Mount, of the steam schooner "Louis Bucki," reports: "A hurricane on the 19th and 20th; lowest barometer, 29.00 (736.6), at 3 a. m. of the 20th, in N. 34° 25', W. 76° 50', wind set in from se. to e., and steadily increased from 11 p. m. of the 19th to 3 a. m. of the 20th; after a lull of fifteen minutes wind suddenly shifted to wnw., blowing squally and hard; then moderated gradually. At 10 a. m. of the 19th, thirty minutes before any serious increase in wind, I experienced three huge seas, resembling what are described as tidal waves, each one sweeping the decks and doing considerable damage. The cyclone appeared to be travelling nne., and, considering our position at the commencement (about five miles to windward of Cape Lookout), I was unable to avoid the centre, which passed right over us. My barometer fell at the rate of two-tenths of an inch per hour, and rose as rapidly."

Capt. L. Dexter, of the s. s. "City of Para," reports: "20th, noon, in N. 23° 40', W. 74° 16', wind fresh from wnw., cloudy and threatening weather, heavy ne. swell, barometer 29.75 (755.6), I suppose we are in the sw. quadrant of a cyclone; I steered n. by e. $\frac{1}{2}$ e. forty-four miles until 4 p. m., when barometer stood at 29.60 (751.8), with a wnw. gale; slowed engine lowest possible speed, heading nne., took in all sail; 8 p. m., barometer 29.51 (749.5), hard wsw. gale with squalls and rain, increased speed to six miles per hour, making nne. course; midnight, barometer 29.41 (747.0), increasing sw. wind, squally, steering n., eleven miles per hour. 21st, 4 a. m., barometer 29.35 (745.5), hard s. gale, squally with blinding rain; 8 a. m., barometer 29.51 (749.5), very hard sse. gale, terrific squalls, blinding rain, heavy sea, ship running before it; noon, barometer 29.67 (753.6), wind se., moderate, weather clearing in ne.; wind continued se. and barometer rose rapidly." This vessel evidently entered the southwest quadrant of depression number 5 during the night of the 19-20th, and during the 20th and 21st was within the area of depression number 8.

Capt. C. L. Rigby, of the s. s. "Wyoming," reports: "21st, noon, Greenwich time, in N. 43° 32', W. 59° 08', barometer 29.79 (756.7), air 66°, light variable winds mostly southerly, with rain, wind backing to eastward; 4 p. m., in N. 43° 17', W. 60° 16', strong ese. wind, with heavy rain, wind veering to sw., barometer 29.70 (754.4), air 69°; 6.10 p. m., wind fell light and veered round by w. to nw. and ne., and increased to hurricane force with a very heavy sw. sea; 7.30 p. m., in N. 43° 02', W. 60° 50', barometer 29.05 (737.9), air 65°, still blowing the same, with heavy rain and a very heavy confused sea; 8 p. m., wind moderating and backing to nw., barometer 29.16 (740.7), air 62°; midnight, in N. 42° 46', W. 61° 36', strong nw. breeze and clearing weather, barometer 29.72 (754.9), air 67°."

Capt. W. Rea, of the s. s. "Bassano," reports a whole gale on the 20th and 21st; wind backed from sw. to se. and n.; lowest barometer, 29.35 (745.5), at 1.30 a. m. of the 21st, in N. 40° 35', W. 68° 04'. The gale was accompanied by very heavy rain, terrific thunder and lightning, and a confused sea. Capt. A. G. Braes, of the s. s. "State of Nebraska," reports a hurricane of short duration on the 21st; wind backed from se. to nne.; lowest barometer, 29.21 (741.9), at noon, in N. 42° 33', W. 62° 04'. Third Officer G. E. Doyle, of the s. s. "British Prince," Capt. S. Nowell, commanding, reports a hurricane on the 20th and 21st; wind backed from s. by e. to se. by s., and shifted suddenly to nw. by n.; lowest barometer, 29.09 (738.9), at 11.30 p. m., in N. 39° 54', W. 69° 20'. Capt. W. Topser, of the s. s. "Rhein," reports a ssw. to wnw. storm on the 21st; lowest barometer in N. 40° 05', W. 66° 20'. Capt. G. D. Spicer, of the sp. "Charles S. Whitney," reports a hurricane on the 21st and 22d; wind veered from sse. to nw.; lowest barometer, 29.39 (746.5), at 4 a. m. of the 22d, in N. 42° 15', W. 52° 50'.

Capt. R. T. Jones, of the s. s. "Galileo," reports: "22d, in N. 42° 22', W. 51° 19', at noon; 3.30 a. m., a strong gale from sw., with high, rough sea; 7.30 a. m., shifted to w., barometer 29.44 (747.8); 11 a. m., shifted to nw., barometer 29.58 (751.3), and gradually decreased into strong breeze." Second Officer Allan Call, of the s. s. "Ohio," Capt. P. R. W. Sargent, commanding, reports: "22d, 10 a. m., in N. 45° 00', W. 41° 30', wind s., increasing and hauling to westward; 4 p. m., wind falling light; 6 p. m., wind increasing from nw., barometer 29.57 (751.1); 7 p. m., blowing a hurricane, barometer 29.08 (738.6); 7.30 p. m., moderating, strong gale." Capt. W. Tyson, of the s. s. "Holland," reports a fresh gale on the 22d; wind backed from se. to n.; lowest barometer, 29.12 (739.6), at 11.44 a. m., in N. 47° 10', W. 41° 30'. Capt. J. H. Stiefel, of the s. s. "Europa," reports a fresh gale on the 22d and 23d; wind backed from ne. to nw.; lowest barometer, 29.20 (741.7), at 11.09 a. m., in N. 48° 23', W. 38° 09'.

Capt. W. McMickan, of the s. s. "Umbria," reports a hurricane on the 23d and 24th; wind backed from se. to e. and nw.; lowest barometer, 28.85 (732.8), at 1 p. m. of the 23d, in N. 49° 40', W. 31° 40'. Capt. S. Brooks of the s. s. "Arizona," reports: "23d, noon, Greenwich time, in N. 50° 51', W. 26° 30', barometer 29.34 (745.2), wind s., moderate gale, barometer falling very rapidly and wind backing to se.; 9 p. m., in N. 50° 30', W. 30° 00', barometer 28.73 (729.7), wind had backed to nw. round by e. ne., and n., barometer began to rise, and a furious nw. gale prevailed till after midnight." Capt. T. L. Evans, of the s. s. "Mineola," reports a hurricane on the 23d and 24th; wind veered from se. to w. and nne.; lowest barometer, 29.00 (736.6), at 8 p. m. of the 23d, in N. 51° 10', W. 30° 30'. Capt. W. Abbott, of the s. s. "Marengo," reports a whole gale on the 23d and 24th; wind veered from sw. to wnw.; lowest barometer, 28.74 (730.0), at 6 p. m. of the 23d, in N. 49° 18', W. 26° 33'.

Capt. W. James, of the s. s. "Oxford," reports a whole gale from the 23d to 27th; wind veered from se. to nw.; lowest barometer, 28.69 (728.7), at 2.30 p. m. of the 23d, in N. 50° 21', W. 30° 39'. Fourth Officer Lossius, of the s. s. "Britannic," Capt. H. Parsell, commanding, reports a gale on the 27th; wind veered from se. to wnw.; lowest barometer, 29.09 (738.9), in N. 51° 06', W. 23° 58'. Capt. W. Kuhlwein, of the s. s. "Gellert," reports a whole w. to nw. gale from the 27th to 29th; lowest barometer, 29.26 (743.2), at 5 a. m. of the 27th, in N. 49° 40', W. 23° 20'. Capt. W. Skjöldt, of the s. s. "Island," reports a fresh gale on the 26th and 27th; wind backed from sw. to e. and nw.; lowest barometer, 28.84 (732.5), at 9 a. m. of the 25th, in N. 56° 6', W. 26° 35'. Capt. W. J. Boggs, of the s. s. "Indiana," reports a strong gale on the 26th and 27th; wind veered from sw. to nw.; lowest barometer, 29.13 (739.9), at noon of the 26th, in N. 50° 52', W. 21° 05'.

6.—This depression was central on the 16th over the Gulf of Saint Lawrence, whence it moved eastward over the northern portion of Newfoundland by the 17th; by the 18th the centre of depression had moved southeast and united with depression number 7 which had advanced from the southwest.

7.—This depression left the American coast in about N. 38° and on the 16th was central in N. 38°, W. 70°, with fresh to strong gales and rain; by the 17th the storm-centre had advanced to N. 40°, W. 60°, and thence passed to N. 45°, W. 47°, by the 18th, where it united with depression number 6; moving rapidly northeast, the centre of depression was central on the 19th in about N. 52°, W. 29°, after which it disappeared beyond the region of observation.

The following special reports indicate the general character of the disturbances attending this depression:

Capt. W. Rea, of the s. s. "Bassano," reports a strong gale on the 17th; wind veered from se. to sw.; lowest barometer, 29.62 (752.3), at 3 p. m., in N. 40° 40', W. 54° 40'. Captain Schade, of the s. s. "Polaria," reports a strong nw. to wnw. gale on the 19th and 20th; lowest barometer, 29.71 (754.6), at 1 p. m. of the 19th, in N. 49° 32', W. 38° 30'.

8.—The presence of this depression to the eastward of the

Windward Islands was indicated by vessel reports of the 19th; by the 20th the centre of depression had moved west-north-west to about N. 22°, W. 66°, whence it is traced to N. 26°, W. 76° by the 21st. On this date south to west gales of hurricane force prevailed over the eastern portion of the Bahama Islands; in the vicinity of the thirtieth parallel fresh easterly gales were reported, while off the Florida coast strong northerly gales prevailed. During the 22d and 23d the storm-centre circled slowly northward, with a marked decrease in energy; by the 24th it had advanced to N. 32°, W. 76°, and during its northeast passage along the course of the Gulf Stream during the next two days it was attended by hurricanes of exceptional violence.

During the 26th and the early morning of the 27th the depression advanced northeast to the fiftieth parallel, its path being to the westward of the Banks of Newfoundland and touching the southeastern extremity of Newfoundland. This direction of movement was, presumably, occasioned by an area of relatively high barometric pressure which occupied the ocean to the southeastward of the Banks, whereby the depression was deflected to a more northerly course than that which it had previously held. During the 28th and 29th the centre of depression passed too far to the northward of the region of observation to permit of other than an approximate course being given to its path; by the 30th, however, its presence to the westward of the British Isles, in about N. 57°, was clearly shown, and its subsequent passage to the north of Scotland was indicated by reports of the 31st. This storm was remarkable both by reason of the extent of territory it traversed and on account of the great energy displayed throughout its entire course, the only period during which a diminution of strength was observable being on the 22d and 23d, during its re-curve over, and to the northward of, the Bahamas.

The general character of the disturbances which attended its passage is shown by the following special reports:

Mr. W. H. Carter, of the s. s. "Earnmoor," Capt. R. J. Grey, commanding, reports: "19th, 11 p. m., left Santiago with a light nw. breeze and hazy weather, barometer falling slowly and sky having every appearance of an approaching hurricane. 20th, weather fine, with light to fresh nw. and w. to wsw. breeze and falling barometer. 21st, in N. 23° 35', W. 74° 16', at noon, at 6 a. m., fine and clear, fresh sw. breeze; 7.30 a. m., heavy squall of wind and rain from sw., lasting one hour, and a heavy northerly sea, falling barometer; 2.40 p. m., passed Watlings Island with a fresh and increasing southerly gale and a heavy sea, also a short n. sea and terrific squalls accompanied with rain. 22d, in N. 27° 06', W. 74° 20', a heavy gale and tremendous sea running, with torrents of rain, brought ship to the wind which was sse. at 4 a. m., with slowly rising barometer; 5 a. m., barometer again falling, se. gale and ssw. sea, with very unsteady barometer continued throughout the day. 23d, in N. 30° 44', W. 74° 36', at noon, fresh gale continued up to 4 p. m., then moderated; midnight, fresh gale again from ese., with falling barometer. 24th, in N. 33° 51', W. 74° 40', at noon, fresh gale, falling barometer, heavy sea; towards noon it blew a heavy gale from e. and ssw., with terrific squalls and rain; 4 p. m., hard gale and high sea, falling barometer, fresh gale continued up to midnight. 25th, in N. 36° 56', W. 74° 49', at noon, at 4 a. m. wind hauled to ne., with fresh gale and tremendous sea; noon, strong northerly gale and rising barometer, in p. m. the wind moderated."

Captain Legoe, of the s. s. "Pomona," reports: "20th, after leaving Cape Maysi, Cuba, wind came into the uw., moderate; wind freshened at night and sky looked very red; during night wind hauled to westward and freshened, with squalls and heavy rain. 21st, at Watlings Island, weather looked very dirty, and barometer continued falling; wind hauled to s. with terrific squalls and heavy rain; ship running before the wind and sea; at 5.30 p. m., hove the ship's head to the sea, barometer still falling; between 10 and 11 p. m., blew very hard, afterwards moderating. 22d, in N. 26° 44', W. 74° 11', took off crew of the wrecked schooner "Mary E. Douglass," which had

been caught in two hurricanes. 23d, in N. 30° 56', W. 74° 20', at noon, strong gale from se. and high sea with rain. 24th, in N. 34° 24', W. 74° 20', at noon, very squally, with rain and high seas. 25th, in N. 38° 04', W. 72° 00', at noon, at 5 a. m., wind changed to n. and blew a gale with very heavy sea."

Capt. Frank Stevens, of the s. s. "Manhattan," reports: "22d, 11 p. m., in N. 30° 0', W. 80° 40', very bad looking weather, and barometer falling rapidly, strong ene. gale and very heavy se. sea; hove-to head to the northward. 23d, 9.30 a. m., turned round and ran to southward, barometer 29.63 (752.6), wind inclined to back to northward; 11 p. m. hove-to head to eastward, hard wnw. gale, barometer 29.43 (747.5), very heavy ne. sea. 24th, 9 a. m., rising barometer, hard nw. gale. On the 23d, at sunset, the sky was full of 'mares-tails,' more than I ever saw before, and moving in all directions, the lower clouds from n.; the ones next above them from sw., then some from se., and some from ne."

Capt. Charles Brown, of the barkentine "Josephine," reports: "24th, barometer continued falling until 19 h. 30 m., in N. 38° 13', and W. 74° 40', to 29.65 (753.1), with light rain, and the wind gradually backed from se. to ne., when it suddenly increased to force 8; the barometer then commenced to rise, and the wind gradually increased and backed to n. by w., with increasing sea. 25th, 3 h. 15 m., sky commenced to clear, but the wind increased until 4 h. 58 m., when it blew heaviest from n. by w., force 10, with sea heavy from n. by w., after which it moderated gradually." First Officer J. C. Norton, of the s. s. "Yemassee," Capt. S. O. Platt, commanding, reports: "24th, noon, in N. 37° 38', W. 74° 50', barometer 29.75 (755.6) and falling steadily, sea swell fast, long, and heavy, heavy clouds in e. and s.; 4 p. m., wind had backed to e., blowing in heavy gusts, with rain squalls; 8 p. m., wind ne., barometer 29.48 (748.8), hard gale; 11 p. m., barometer 29.27 (743.4), lowest, wind a hurricane. 25th, 2.40 a. m., Hatteras west, immense sea; during the day the barometer rose and wind backed to n. and nnw."

Capt. E. Wylie, of the s. s. "Catalonia," reports: "25-26th, between longitudes 58° and 68°, had very unsettled weather; wind attained force of a fresh gale, accompanied by a heavy electrical storm, balls of flame being on all extremities aloft; wind backed gradually from s. to e. and w. by n." Capt. W. McMickan, of the s. s. "Umbria," reports: "26th, in N. 42° 27', W. 59° 20', noon; 2 p. m., Greenwich time, barometer 29.80 (756.9), wind s., overcast and much rain, barometer falling rapidly, and wind increasing, with a high, confused sea; 3 p. m., wind se., and a tremendous sea running; wind fell very light; to all appearances in the centre of a cyclone; engines slowed; 5.30 p. m., barometer 28.65 (727.7); during a heavy squall of rain and wind the wind went to nnw. and blew with hurricane force for two hours and then gradually moderated to strong gale from nw., with high sea."

Captain Vogelgesang, of the s. s. "Rhaetia," reports a whole gale on the 26th; wind backed from nne. to w.; lowest barometer, 29.30 (744.2), at 7 a. m., in N. 41° 55', W. 65° 00'. Capt. E. Santelli, of the s. s. "La Gascogne," reports a hurricane on the 26th and 27th; wind backed from ese. to nw.; lowest barometer, 28.58 (725.9), at 1.30 p. m. of the 26th, in N. 42° 29', W. 62° 00'. Second Officer Call, of the s. s. "Ohio," Capt. P. R. W. Sargent, commanding, reports: "26th, 8 a. m., in N. 41° 28', W. 62° 02', encountered a hurricane from sse., barometer 29.51 (749.5); noon, barometer 28.20 (716.3), wind hauled to nw., and storm continued four hours, with very high sea." Capt. G. Evans, of the s. s. "Peconia," reports a hurricane on the 26th; wind backed from ssw. to e. and nw.; lowest barometer, 28.11 (714.0), at 7 a. m., in N. 39° 19', W. 64° 14'.

Capt. W. Tyson, of the s. s. "Holland," reports a hurricane on the 26th; wind backed from s. to n.; lowest barometer, 28.52 (724.4), at 9.53 a. m., in N. 42° 41', W. 61° 47'. Capt. W. G. Crockhart, of the s. s. "Devonia," reports a storm on the 26th; wind veered from sse. to nw.; lowest barometer, 28.44 (722.4), at 7.15 p. m., in N. 43° 37', W. 56° 24'. Capt. R. B. Stannard, of the s. s. "Crystal," reports a whole gale

on the 26th; wind backed from ne. to nw.; lowest barometer, 29.24 (742.7), at 11 a. m., in N. 42° 00', W. 64° 12'. Capt. E. H. Freeth, of the s. s. "British Princess," reports a hurricane on the 26th; wind veered from se. to w.; lowest barometer, 28.67 (728.2), at 1 p. m., in N. 43° 12', W. 60° 09'. Capt. S. Brooks, of the s. s. "Arizona," reports: "26th, 8 p. m., Greenwich time, in N. 45° 06', W. 53° 10', strong breeze from s., and fog, barometer 29.67 (753.6), and falling rapidly; 10 p. m., barometer 28.70 (729.0), wind a hurricane from sse., ship completely enveloped in spray; midnight, in N. 44° 50', W. 54° 00', barometer lowest, 28.50 (723.9), wind began hauling to westward, and barometer commenced to rise; wind settled down to hard wsw. gale, with tremendous high-breaking seas, and barometer continued to rise rapidly."

Capt. J. H. Stiefel, of the s. s. "Europa," reports a hurricane on the 26th; wind veered from sse. to w.; lowest barometer, 28.80 (731.5), at midnight, in N. 44° 10', W. 54° 40'. Capt. G. D. Spicer, of the sp. "Charles S. Whitney," reports a hurricane on the 26th; wind backed from sse. to nw.; lowest barometer, 28.40 (721.3), at 7 p. m., in N. 42° 30', W. 60° 30'. Capt. W. Pearce, of the s. s. "Italy," reports a heavy sw. to w. gale on the 27th; lowest barometer, 29.01 (736.8), at 1 a. m., in N. 45° 00', W. 50° 30'. First Officer Lossius, of the s. s. "Britannic," Capt. H. Parsell, commanding, reports a strong gale from the 28th to the 30th; lowest barometer, 29.44 (747.8), on the 29th, in N. 48° 40', W. 38° 30'.

Capt. G. de Kersabiec, of the s. s. "La Normandie," reports a whole wsw. to nw. gale from the 29th to 31st; lowest barometer, 29.22 (742.2), at 6 a. m. of the 30th, in N. 50° 15', W. 24° 30'. Capt. G. Stenger, of the s. s. "Leerdam," reports a whole wsw. to wnw. gale on the 29th and 30th; lowest barometer, 29.50 (749.3), at 10 a. m. of the 29th, in N. 48° 05', W. 36° 03'. Capt. H. Christoffers, of the s. s. "Aller," reports a whole sw. to wnw. gale from the 28th to 30th; lowest barometer, 29.33 (745.0), at 4 p. m. of the 29th, in N. 49° 13', W. 35° 29'. Capt. W. Skjoldt, of the s. s. "Island," reports a whole gale on the 28th and 29th; wind veered from s. to nw.; lowest barometer, 29.09 (738.9), at 7 a. m. of the 28th, in N. 52° 06', W. 41° 20'.

9.—This depression was central on the 19th over the Gulf of Saint Lawrence, and by the 20th had moved eastward to N. 51°, W. 49°, with a fair display of energy; by the 21st the storm-centre had advanced to N. 52°, W. 32°, with moderate to fresh gales over a considerable area; by the 22d the centre of depression had passed northeast to about N. 58°, W. 25°, in which position barometric pressure ranging below 29.00 (736.6) was indicated; by the 23d the storm had disappeared to the northward of the region of observation.

OCEAN ICE.

On chart i are also exhibited the limits within which icebergs and field ice were reported during August, 1887. These limits are determined from reports furnished by shipmasters, and from data collected by the Signal Service agencies.

The easternmost ice was passed on the 5th, in N. 48° 0', W. 40° 0', by the bark "Bessie Parker," and the southernmost ice reported was observed on the 11th, in N. 42° 21', W. 49° 51', from the s. s. "Sidonian."

Ice was most frequently observed during the month on the southeastern edge of the Banks of Newfoundland. Many large bergs were passed in Belle Isle Straits during the 5th and 6th, after which no ice was reported in that locality. On the 4th, 5th, and 25th, only, icebergs were reported in the vicinity of Cape Race.

As compared with ice reported during July, 1887, there is a marked decrease in the aggregate quantity of ice reported about Belle Isle Straits, while the accumulation of ice on the southeast edge of the Banks of Newfoundland is a distinctive feature of August, 1887, and the southern limit is over one degree farther south than the position in which isolated bergs were reported for July. The extreme eastern limit of ice is about one degree farther east than in July.

The quantity of ice reported during August, 1887, greatly exceeded that of the corresponding month of the preceding year, when the ice-area was confined to the locality of Belle Isle Straits and to isolated positions north of the forty-eighth parallel.

The following table shows the southern and eastern limits of the region within which ice was reported for August during the last six years:

Southern limit.			Eastern limit.		
Month.	Lat. N.	Lon. W.	Month.	Lat. N.	Lon. W.
August, 1882.....	46 50	46 00	August, 1882.....	46 50	46 00
August, 1883.....	43 26	51 47	August, 1883.....	38 00	44 00
August, 1884.....	43 24	48 44	August, 1884.....	47 50	43 50
August, 1885.....	43 48	52 04	August, 1885.....	48 03	42 45
August, 1886.....	48 35	48 46	August, 1886.....	50 00	48 00
August, 1887.....	42 21	49 51	August, 1887.....	48 00	40 00

Icebergs and field ice were reported as follows:

Date.	Vessels.	Position. Lat. N. Lon. W.	Remarks.
		O / O /	
4	Ycht. Dauntless.....	43 22 53 10	One berg.
	Bk. Charles Luling.....	43 37 48 56	One large berg.
	S. S. Monte Rosa.....	30 miles off C. Race.	One large berg.
5	S. S. Ems.....	45 25 49 17	One moderate sized berg.
	S. S. Grecian.....	53 30 50 00	One very large berg.
	S. S. Monte Rosa.....	30 miles northeast Cape Race.	Several large bergs.
	S. S. Lake Nipigon.....	Off Mordof Island, Straits of Belle Isle.	Many large bergs.
	Bk. Bessie Parker.....	48 00 40 00	Several medium sized bergs.
6	S. S. Harbinger.....	43 21 49 45	Two large bergs.
	S. S. Grecian.....	Belle Isle to Cape Norman.	Three very large bergs. [ward.
7	S. S. Worcester.....	48 10 49 30	One immense berg to the south- [bergs.
	S. S. Polynesia.....	43 20 49 40	One berg.
	Bk. Sarah Chambers.....	43 00 49 30	One very large and seven small
9	Bk. Tolvo.....	42 30 52 00	One very large berg.
		43 15 49 40	One large berg.
10	S. S. Milanese.....	43 15 49 19	One large berg.
11	S. S. Sidonian.....	42 21 49 51	One large berg.
12	S. S. Santiago.....	42 40 49 40	One large berg.
13	S. S. Westernland.....	42 34 49 52	One large and two small bergs.
14	S. S. Columbia.....	42 56 50 08	Collided with large berg.
		42 41 50 24	One small berg.
	S. S. Stranton.....	43 12 49 57	One very large berg.
16	S. S. Trave.....	47 25 47 16	One small berg.
	Bgt. D. H. Waetjen.....	42 59 50 02	One large berg.
17	S. S. Anchoria.....	47 44 46 37	One small berg.
		47 43 46 42	One large berg.
19	S. S. Wyoming.....	47 08 47 25	One small berg and pieces of ice.
	Sp. Charles S. Whitney.....	43 03 50 10	
21	S. S. British King.....	42 52 50 16	One berg.
23	S. S. Saale.....	46 04 47 23	One large berg.
	S. S. Catalonia.....	45 58 47 16	One berg. [ward.
24	S. S. Etruria.....	46 00 46 46	One large berg ten miles to north- [ward.
25	S. S. La Gascogne.....	Off Cape Race.....	One berg.
	S. S. Europa.....	46 00 47 01	
		45 55 47 22	
	S. S. Gleniffer.....	43 10 49 45	One berg.
		43 01 50 19	One very large berg.
30	S. S. Borderer.....	42 45 50 30	One berg and lumps of ice.

FOG.

On chart i the limits of fog-belts to the westward of the fortieth meridian are shown by dotted shading.

Fog was encountered over and near the Banks of Newfoundland on eighteen dates, and its reported southern limit was about two degrees farther north than in July. In the vicinity of Sable Island Bank fog was reported on three dates. Over and near Georges and Nantucket Shoals fog prevailed on eight dates.

A study of the meteorological conditions which attended the presence of fog in the vicinity of the Newfoundland Banks, shows that its development preceded and accompanied the passage of cyclonic areas from the American continent north of the fortieth parallel. Of the eighteen dates for which fog was reported in that region, areas of low barometric pressure were located as follows: on seven dates to the northward of the Banks or of Newfoundland; on five dates in the Valley or Gulf of Saint Lawrence; on five dates south of Nova Scotia or Newfoundland; and on one date to the eastward of the Banks. It therefore appears that its denser development in the Newfoundland fog-belt was due to a shift of wind to southerly in

advance of centres of cyclonic areas, and its disappearance was shown to follow a shift of wind to the northwest quadrant, following the passage of low barometer areas.

On the three dates for which fog was reported near Sable Island Bank, areas of low pressure appeared to the southward or southwestward of Nova Scotia on two dates, and to the northward of the Newfoundland Banks on one date.

Of the eight dates for which fog was reported over or near Georges and Nantucket Shoals, the presence of low barometer areas to the northward or eastward, west of the fortieth meridian, was shown on six dates; on one date a storm was central off Hatteras, and on one date the fog was reported in close proximity and to the westward of a cyclonic centre. As regards fog reported in the last-named localities, it would appear that its development accompanied a shift of wind to northerly, following the passage of centres of low barometer areas.

The fog reports for August furnish additional proof of the fact that the denser fog formations over the north Atlantic Ocean, west of the fortieth meridian, are intimately connected with, and dependent upon, the circulation of wind in cyclonic areas.

The following are the limits of fog-areas on the north Atlantic Ocean during August, 1887, as reported by shipmasters:

Date.	Vessel.	Entered.			Cleared.		
		Lat. N.	Lon. W.	Time.	Lat. N.	Lon. W.	Time.
1	S. S. Main	46 22	46 52	1.30 a. m.	44 46	51 40	6 p. m., at intervals.
1	S. S. Hekla	45 00	47 00		43 09	55 00	
1	S. S. Edam	48 40	44 00		46 30	50 00	
1	S. S. Pennland	43 24	44 50		43 34	44 24	
2	S. S. Devon	42 40	60 03		43 35	56 47	
2	S. S. California	42 54	58 49		42 27	61 15	
2-3	S. S. La Champagne	42 31	54 39		44 48	45 31	
2-3	S. S. Rugia	46 11	44 24		44 39	52 10	
3	S. S. Vaderland	43 43	45 30		43 50	45 10	

Limits of fog areas—Continued.

Date.	Vessel.	Entered.			Cleared.		
		Lat. N.	Lon. W.	Time.	Lat. N.	Lon. W.	Time.
4	S. S. Buffalo	42 35	65 50		42 33	66 30	
5-6	S. S. Sarnia	53 51	49 51		51 40	56 10	
6-7	S. S. Servia	40 53	68 39		40 34	70 12	
7	S. S. Circassia	40 53	67 42		40 43	68 43	
7	S. S. Scandinavian	43 25	59 53		43 24	60 08	
7	S. S. Denmark	45 53	49 37		45 49	50 06	
8	do	44 49	53 13		44 38	53 45	
8	S. S. Schiedam	46 18	48 50		44 34	53 45	
8-9	Bk. Tolvo	43 52	49 10		43 49	49 19	
11	do	43 40	51 44		43 36	52 07	
12	S. S. Taormina	46 33	43 17		45 02	48 55	
12-13	St. John's, N. F., dense fog at sea.	42 52	47 58		42 44	48 24	
13	S. S. Westernland	44 21	51 13		49 09	51 56	
13-14	S. S. Taormina	44 45	49 30		46 37	43 09	
13-14	S. S. Britannic	47 06	44 34		45 36	50 47	
13-14	S. S. Rotterdam	44 34	49 40		46 25	38 28	
13-15	S. S. France	44 12	52 10	2 a. m.	48 15	41 00	4 a. m.
13-15	S. S. Baltimore	46 36	48 06		48 02	49 52	
14	S. S. Geiser	45 21	46 46		44 30	49 01	
14	S. S. DeRuyter	47 00	43 09		46 06	46 34	
17	S. S. Rotterdam	41 14	67 30		47 55	36 23	South of Nantucket shoals.
17	S. S. La Champagne	48 04	35 36		47 32	45 26	
17	S. S. Spain	48 06	43 39		40 56	68 18	
18	S. S. Geiser	41 18	67 39		41 16	67 31	
18	S. S. DeRuyter	41 39	66 17		41 05	67 20	At inter-vals.
18	S. S. City of Richmond	41 22	65 40		42 21	50 20	At inter-vals.
19-20	S. S. Bohemia	41 40	65 42	8 p. m.	40 44	69 29	At inter-vals.
19-20	S. S. Wyoming	47 17	46 46	10 a. m.	47 03	47 37	At inter-vals.
20	S. S. La Champagne	41 12	66 13		40 25	69 26	At inter-vals.
20	S. S. Belgenland	45 26	47 24		45 08	52 30	At inter-vals.
21	S. S. Galileo	43 57	45 30		42 21	50 20	At inter-vals.
21	St. John's, N. F., dense fog at sea.	45 45	49 15		45 20	50 30	
23-24	S. S. Rhætia	42 26	66 41		42 26	67 36	
23	St. John's, N. F., dense fog at sea.	43 56	57 30		43 32	58 32	
25	St. John's, N. F., dense fog at sea.	43 56	57 30		44 07	54 55	
25	S. S. British Princess	44 43	51 38		44 27	53 41	
26	S. S. Devon	44 43	53 14		45 43	49 23	
26	S. S. Europa	44 54	51 38		46 14	47 42	
30	S. S. Waealand	46 11	48 04		45 43	49 23	
30	S. S. Britannic	46 44	46 25		45 34	50 55	
31	S. S. Island	46 02	49 36				

TEMPERATURE OF THE AIR (expressed in degrees, Fahrenheit).

The distribution of mean temperature over the United States and Canada for August, 1887, is exhibited on chart ii by the dotted isothermal lines. In the table of miscellaneous data are given the monthly mean temperatures, with the departures from the normal, for the various stations of the Signal Service; the figures opposite the names of the geographical districts in the columns for mean temperature, precipitation, and departures from the normal, show respectively the averages for the several districts. The normal for any district may be found by adding the departure to the current mean for the district when the departure is below the normal, and subtracting when above. On chart iii (formerly chart iv) the departures from the normal are illustrated by lines connecting stations of normal or equal abnormal values.

With respect to temperature, the month of August has not been marked by unusual conditions, the monthly means generally being normal, or differing but slightly therefrom, in nearly all parts of the United States. Along the immediate coasts of New England and the middle Atlantic States, in the Ohio and central Mississippi valleys, southern plateau, southern slope, and portions of Oregon and Washington Territory, the month has been slightly warmer than the average, while in all other portions of the country the temperature was normal or below. The region over which the most marked departures from normal temperature occur extends from Idaho eastward to Minnesota, where the monthly means are from 2° to 4° below the average.

The following are some of the most marked departures from the normal temperature at Signal Service stations, where the records cover ten or more years of observation:

Above normal.		Below normal.	
Fort Davis, Tex.	2.6	Yankton, Dak.	3.1
Louisville, Ky.	2.3	Saint Paul, Minn.	3.0
Saint Louis, Mo.	2.2	San Diego, Cal.	2.8
Nashville, Tenn.	1.5	Mount Washington, N. H.	2.7
Knoxville, Tenn.	1.0	Bismarck, Dak.	2.4
Dodge City, Kans.	0.8	Saint Vincent, Minn.	2.3
Cincinnati, Ohio	0.7	La Crosse, Wis.	2.3

RANGES OF TEMPERATURE.

The monthly, and the greatest and least daily, ranges of temperature, at Signal Service stations are given in the table of miscellaneous meteorological data.

The monthly ranges are greatest, and exceed 50°, in the upper Mississippi and Missouri valleys, and in portions of the northern slope and northern and middle plateau districts; they are least along the Gulf and Pacific coasts, where they vary from 15° to 30°.

The following are some of the greatest and least monthly ranges at Signal Service stations:

Greatest.		Least.	
Winnemucca, Nev.	67.3	Key West, Fla.	14.2
Fort Yates, Dak.	61.2	Corpus Christi, Tex.	18.1
Fort Klamath, Oregon	60.0	Jacksonville, Fla.	19.4
Saint Vincent, Minn.	58.7	Galveston, Tex.	19.9
Valentine, Nebr.	58.2	Brownsville, Tex.	21.3
Boise City, Idaho	58.1	Cedar Keys, Fla.	21.7
Dubuque, Iowa	55.3	Tatoosh Island, Wash.	22.1
Yankton, Dak.	55.0	San Diego, Cal.	23.2

The greatest daily ranges of temperature vary from less than 20° at stations along the Gulf coast to more than 40° over the northern Rocky Mountain districts.